



Detection of human influence on twentieth-century precipitation trends

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Abstract:

Human influence on climate has been detected in surface air temperature, sea level pressure, free atmospheric temperature, tropopause height and ocean heat content. Human-induced changes have not, however, previously been detected in precipitation at the global scale, partly because changes in precipitation in different regions cancel each other out and thereby reduce the strength of the global average signal. Models suggest that anthropogenic forcing should have caused a small increase in global mean precipitation and a latitudinal redistribution of precipitation, increasing precipitation at high latitudes, decreasing precipitation at sub-tropical latitudes, and possibly changing the distribution of precipitation within the tropics by shifting the position of the Intertropical Convergence Zone. Here we compare observed changes in land precipitation during the twentieth century averaged over latitudinal bands with changes simulated by fourteen climate models. We show that anthropogenic forcing has had a detectable influence on observed changes in average precipitation within latitudinal bands, and that these changes cannot be explained by internal climate variability or natural forcing. We estimate that anthropogenic forcing contributed significantly to observed increases in precipitation in the Northern Hemisphere mid-latitudes, drying in the Northern Hemisphere subtropics and tropics, and moistening in the Southern Hemisphere subtropics and deep tropics. The observed changes, which are larger than estimated from model simulations, may have already had significant effects on ecosystems, agriculture and human health in regions that are sensitive to changes in precipitation, such as the Sahel.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Precipitation

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Climate Change and Human Health Literature Portal

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Model/Methodology:

type of model used or methodology development is a focus of resource

Methodology

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified